

## **Aspects of Agro-Environmental Sustainability in the Perimeter Irrigated Piauí in Lagarto (Sergipe State) Northeastern Brazil**

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The relationships established between man and the environment influence the way it operates on natural resources. Family farming marks man's relationship with his land and excels as a prime location for the development of sustainable agriculture. The sustainability associated with agriculture stems in identifying attributes that ensure good soil conditions, crop health and balance between production, livelihood and the environment.

Since the 1960's, under the conditions of Brazilian agriculture, a greater concern for environmental issues has arisen due to the search for viable solutions for sustainability and environmental protection around the world. In this respect, family farming has manifested itself as a favorable system, both socio-economically as well as environmentally, with access to sustainability, rural development, food security and poverty alleviation in the country.

Family farming in Sergipe State has as its main characteristic the close relationship between management and labor, with emphasis on productive diversity, sustainability of natural resources, and quality of life (Buainain and Romeiro, 2000). One of the familiar characteristics of agriculture is its openness to diversified production systems, with polycultures or associated with crops and livestock. The diverse crop management is an important element in economic and environmental sustainability (Altieri et al., 2003).

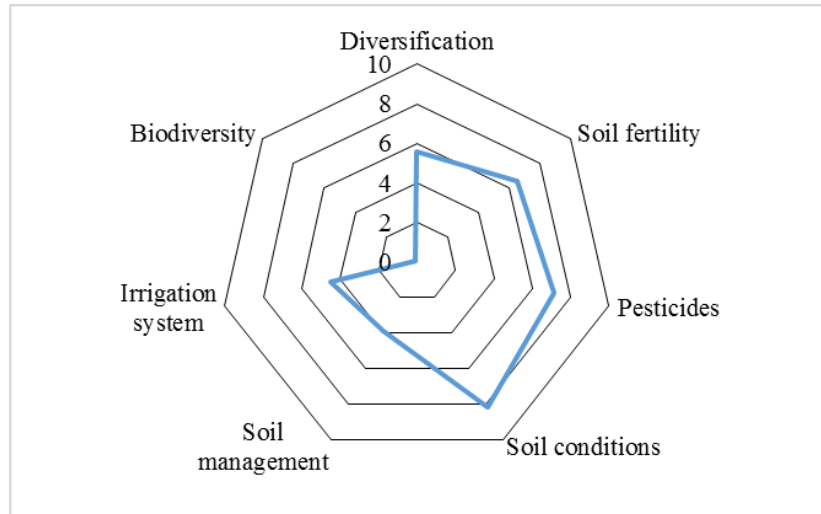
The objective of this research was to evaluate the agro-environmental (AE) sustainability of family farming in the irrigated Piauí fields near the town of Lagarto, State of Sergipe, Brazil. Thus, it relied on the assumption that diversifying crops in agriculture tends to contribute to more sustainable systems related to social, economic and environmental points of view. The study was guided by theoretical frameworks that address family farming, sustainable agriculture and the use of indicators for assessing sustainability in agriculture, from the systemic approach and fieldwork. The indicators were selected and analyzed using the IDEA (Indicateurs de Durabilité des Exploitations Agricoles - Farm Sustainability Indicators) method (Briquel, 2001), with adaptations based on Jesus (2003) and Tavares (2009), that identified and quantified the main factors limiting sustainability in family farm production systems of the study area.

The indicators showed the potential aspects and the limiting aspects of 45 studied properties, whose results are consolidated into Figure 1. The diversification criterion showed the greatest influence on the behavior of other criteria. It was noted that the more diverse the production system in the property, the better the soil conditions and fertility. The presence of annual and perennial crops, livestock and the spatial organization of the crops in the agricultural area were important aspects in boosting the agricultural system, capable of delivering greater socio-economic and environmental efficiencies. The number of crops per farm ranged between 2 and 8, willing crops in the form of land plots, which may or may not be the same in consortia. The practice of animal husbandry was also an aspect of diversification in family farming, and we noted that 42% of the respondent farmers had livestock, either for consumption or for sale. However, a limiting factor to achieving diversified cropping systems has been the age group of farmers and the unavailability of manpower. The survey determined that the higher the farmer's

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age the lower the diversification of the production system on the property, especially for crops.



**Figure 1.** Evaluation of Agro-environmental sustainability.

The use of irrigation has crucial importance in diversification. However, the adoption of more efficient irrigation systems that provide better management in irrigation time control are needed as sustainable practices. The absence of this factor led some properties to obtain low scores in the indicators of this criterion. The absence of forests, reserves or other forms of biodiversity maintenance also lowered values, affecting the results. We found that most properties do not have this type of resource, a fact which excludes the ability of interaction between agricultural and forestry systems, and improvements in ecosystem services.

We found that in general the properties showed a medium level of sustainability and the AE conditions showed minor axis sustainability, for both organic farmers and conventional farmers. Low diversification was a limiting factor, where farmers with the greatest number of crops and livestock showed the presence of higher than average conditions, but were less diversified, and there was correlation between the indicators and diversified agricultural income.

Thus, the attributes related to the indicators for agricultural practices require primarily efforts to improve the environmental sustainability of their properties. The behavior exhibited in the agro-environmental dimension indicates that more sustainable techniques need to be adopted in order to deal with natural resources in agricultural activities of the irrigated area in Piauí Lagarto, Sergipe, Brazil.

#### References

- Altieri, M.A., E.N. Silva, and C.I. Nicholls. 2003. O papel da biodiversidade no manejo de pragas. Ribeirão Preto: Holos.
- Briquel, V., L. Vilain, J.L. Bourdais, P. Girardin, C. Mouchet, and P. Viaux. 2001. La méthode IDEA (indicateurs de durabilité des exploitations agricoles): une démarche pédagogique. *Ingénieries* 25: 29-39.
- Buainain, A.M., and A. Romeiro. 2000. A agricultura familiar no Brasil: agricultura familiar e sistemas de produção. FAO/INCR PROJETO:UTF/BRA/051/BRA, Brasil.
- Jesus, E.L. 2003. Avaliação da Sustentabilidade Agrícola: uma Abordagem Conceitual e Metodológica. Tese. Universidade Federal Rural do Rio de Janeiro – UFRRJ.
- Tavares, E.D. 2009. Da agricultura moderna à agroecologia: análise da sustentabilidade de sistemas agrícolas familiares. Fortaleza: Banco do Nordeste do Brasil; Embrapa.